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IS 14486 (1997): General Purpose Dot Matrix Printer [LITD 16: Computer Hardware, Peripherals and Identification Cards]

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सामान्य उद्देश्य डॉट मैट्रिक प्रिन्टर — विशिष्टि

Indian Standard

GENERAL PURPOSE DOT MATRIX PRINTER — SPECIFICATION

ICS 35.180; 35.260.10

© BIS 1997

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

October 1997 Price Group 8

Computer Hardware Sectional Committee, LTD 37

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards after the draft finalized by the Computer Hardware Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

The objective of this standard is to lay down performance requirements of Dot Matrix Printer for use with Personal Computers to ensure quality and reliability. This standard is designed to serve the public interest eliminating communication gap between manufacturers and purchasers, in obtaining with minimum delay, the proper product for a particular need.

While preparing this standard, assistance has been derived from STQC Specification DOE/STQC/Computer/5/92 'Specifications for Dot Matrix Printer' issued by STQC Directorate of Department of Electronics.

The technical committee responsible for the preparation of this standard has reviewed the provisions of following IEC Publications and has decided that they may be used in conjunction with this standard to carry out tests given in 4.4.1.1, 4.4.1.2 and 4.4.1.3 of this standard till Indian Standards on these subjects are published.

a) IEC 1000-4-2(1995) 'Electromagnetic compatibility (EMC) : Part 4 Testing and measurement techniques, Section 2 Electrostatic discharge immunity test'.

b) IEC 1000-4-4(1995) 'Electromagnetic compatibility (EMC) : Part 4 Testing and measurement techniques, Section 4 Electrical fast transient/burst immunity test'.

c) IEC 1000-4-5 (1995) 'Electromagnetic compatibility (EMC) : Part 4 Testing and measurement techniques, Section 5 Surge immunity test'.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

AMENDMENT NO. 1 DECEMBER 2000
TO
IS 14486 : 1997 GENERAL PURPOSE DOT MATRIX PRINTER — SPECIFICATION

(*Page* 3, *clause* 4.5.1, *line* 2) — Substitute '3.5 mA' *for* '3.5 A'.

(LTD 37)

Reprography Unit, BIS, New Delhi, India

Indian Standard

GENERAL PURPOSE DOT MATRIX PRINTER — SPECIFICATION

1 SCOPE

This standard specifies general and performance requirements and test methods for characteristics of general purpose Dot Matrix Printer for use in office environment.

2 REFERENCES

The Indian Standards listed in Annex A are necessary adjuncts to this standard.

3 TERMINOLOGY

For the purpose of this standard, the terms and definitions given in IS 1885 (Part 52) series and IS 10422 shall apply in addition to the following:

3.1 Form Feed Time

It is the time taken in seconds for the whole length of paper to advance. The length of one sheet of paper shall be taken as 304.8 mm (12 inch).

3.2 Burst Speed

Burst speed is the rate at which the printer prints between the first and the last characters of a given line. Burst speed shall be specified in CPS (Characters per second).

3.3 Throughput

Throughput is the effective print speed of the printer. Throughput shall be specified in PPH (Page per hour).

3.4 Duty Cycle

Duty cycle is the ratio of printing time to printer 'ON' time (Printing time plus idle time). The printer 'ON' time is considered as eight hours unless otherwise specified. Duty cycle shall be specified in percent.

NOTE — In this standard, dimensions are given in mm and in inch units. The dimensions in inch units will over ride and govern in case of any doubts and disputes.

4 GENERAL REQUIREMENTS

4.1 Physical Requirements

4.1.1 *Workmanship and Finish*

All parts of dot matrix printer shall be constructed from suitable materials and components conforming to relevant IS specifications and shall be manufactured in accordance with good engineering practice.

The printer shall be free from workmanship defects, cracks, scratches, nicks, burrs, sharp edges, etc. All the fasteners shall be properly secured.

The product shall meet the requirements of finish and aesthetics mutually agreed between the manufacturer and the purchaser.

As far as possible, only standard components/items shall be used and they should preferably be type approved by a competent authority.

4.1.2 *Accessories and Documents*

Each dot matrix printer shall be provided with the following:

i) Power cord,
ii) Ribbon cartridge,
iii) User manual,
iv) Paper tray (optional), and
v) Any other items as specified by the manufacturer.

4.2 Functional Requirements

4.2.1 Printing method shall be 'Serial Impact Dot Matrix'.

4.2.2 *Print Head*

The number of wires to be specified by the manufacturer.

4.2.3 *Number of Print Digits*

The number of columns that shall be printed at 0.4 characters per mm (10 CPI) in the printer shall be specified by the manufacturer.

4.2.4 *Standard Character Set*

Reference shall be 8 Bit code as per IS 10401. Specific control codes (00 to 1F Hex) as well as extended codes (80 to FF Hex) for ASCII or IBM characters shall be specified by the manufacturer in the user manual.

For Indian language script, reference may be made to IS 13194.

4.2.5 *Stationery and Paper Handling*

4.2.5.1 *Stationery*

Manufacturer shall specify the following details of stationary in the user manual :

a) Paper width (Range),
b) No. of copies (Parts) to be specified as applicable,
c) Maximum permissible thickness, and
d) Paper mass and stiffness.

4.2.5.2 *Transport*

Both left and right tractors shall be movable. Minimum and maximum range of adjustability shall be specified by the manufacturer.

4.2.5.3 Paper feed types shall be adjustable sprocket type for continuous stationary and friction type for cut sheets.

4.2.5.4 *Paper flow path*

Manufacturer shall specify in the User Manual the path. For example Push, Pull, Rear, Front.

4.2.6 *Ribbon*

Manufacturer shall specify the requirements in the user manual.

4.2.7 *Print Speed*

Both burst speed and throughput shall be specified by the manufacturer.

4.2.7.1 *Burst speed*

4.2.7.1.1 Method of measurement of burst speed for printer with 132 column/136 column at 0.4 characters per mm (10 CPI) is given below:

The test result shall comply within 5 percent of the manufacturer's specification. Unless otherwise specified, the printer shall be set at 0.4 characters per mm (10 CPI).

Step 1: Execute the following program in BASIC language when program starts executing, note the starting time and soon after the printing is completed, note the ending time. Difference between the two is the time taken to print. This is "TIME 1".

```
10   WIDTH "LPT 1:", 255
20   FOR I = 1 TO 100
30   LPRINT STRING $ (132, "A");
40   LPRINT
50   NEXT I
```

Step 2: Execute the following program in BASIC language when the program starts executing, note the starting time and soon after the printing is completed, note the ending time. Difference between the two is the time taken to print. This is "TIME 2".

```
10   WIDTH "LPT 1:", 255
20   FOR I = 1 TO 100
30   LPRINT STRING $ (32, "A");
40   LPRINT STRING $ (100, " ");
50   LPRINT
60   NEXT I
```

Step 3: Compute (TIME 1 – TIME 2) in seconds. This is the effective time taken for printing 100 × 100 characters.

$$\text{Compute using formula} = \frac{100 \times 100}{(\text{TIME 1} - \text{TIME 2})}$$

which should be equivalent to the burst speed.

4.2.7.1.2 Method of measurement of burst speed for printer with 80 column at 0.4 characters per mm (10 CPI) is given below:

The test result shall comply within 5 percent of the manufacturer's specification. Unless otherwise specified, the printer shall be set at 0.4 characters per mm (10 CPI).

Step 1 : Execute the following program in BASIC language when the program starts executing, note the starting time and soon after the printing is completed, note the ending time. Difference between the two is the time taken to print. This is "TIME 1".

```
10   WIDTH "LPT 1:", 255
20   FOR I = 1 TO 200
30   LPRINT STRING $ (80, "A");
40   LPRINT
50   NEXT I
```

Step 2: Execute the following program in BASIC language when the program starts executing, note the starting time and soon after the printing is completed, note the ending time. Difference between the two is the time taken to print. This is "TIME 2".

```
10   WIDTH "LPT 1:", 255
20   FOR I = 1 TO 200
30   LPRINT STRING $ (30, "A");
40   LPRINT STRING $ (50, " ");
50   LPRINT
60   NEXT I
```

Step 3: Compute (TIME 1 – TIME 2) in seconds. This is the effective time taken for printing 50 × 200 characters.

$$\text{Compute using formula} = \frac{50 \times 200}{(\text{TIME 1} - \text{TIME 2})}$$

which should be equivalent to the burst speed.

4.2.7.2 *Throughput*

It shall be measured according to the method given in Annex B.

4.2.7.3 *Form feed time*

The time in seconds for a single form feed of paper of width 304.8 mm (12 inch) shall be specified by the manufacturer.

4.2.8 *Self Test*

The self test facility shall be provided in the printer.

4.2.9 *Status Display/Indicators*

Printer shall have Status Display/Indicators for the following:

a) ON LINE/OFF LINE,
b) POWER ON/OFF, and
c) PAPER OUT.

4.2.10 *Duty Cycle*

'Duty Cycle' shall be specified under the following conditions:

a) 0.4 characters per mm (10 CPI),
b) Draft mode,
c) Rolling ASCII pattern without IBM graphics,
d) At normal conditions of temperature (25 to 30 °C),
e) Humidity (50 to 80 percent), voltage 240 ± 10 percent, and
f) Frequency 50 Hz ± 3 percent.

The manufacturer should specify 'Duty Cycle' of the printer in the product specification sheet. Manufacturer may relate the duty cycle to the life and MTBF of the printer.

4.3 Power Supply Requirements

The dot matrix printer shall be designed to operate on mains power supply as specified below.

4.3.1 *Voltage* (*see* IS 12360)

Mains voltage : 240 V ± 10 percent.

4.3.2 *Frequency* (*see* IS 12360)

Mains frequency : 50 Hz ± 3 percent.

NOTE — If the printer is designed to operate on a wider band, the manufacturer may specify the limits.

4.3.3 *Power Consumption*

Manufactuer shall specify the maximum power consumption in VA.

4.4 EMI/EMC Requirements

4.4.1 Immunity to pulsed electromagnetic interference.

4.4.1.1 *Electrical fast transient/burst immunity test*

See Foreword.

4.4.1.2 *Surge voltage transient or Surge immunity test*

See Foreword.

4.4.1.3 *Electrostatic discharge immunity test*

See Foreword.

4.4.2 EMI

The electromagnetic energy emitted by the printer into the power line by mode of conduction and into the atmosphere by mode of radiation shall not exceed the limits specified in IS 6842 (Amendment 2) for Class A equipments. The printer shall be put in self test mode during testing.

However, the equipment has to meet Class B levels if required by the user.

Manufacturer may get his equipment tested for Class B limits with additional filters and the same may be included in his manuals.

4.5 Electrical Safety Requirements

The dot matrix printer shall conform to the relevant requirements specified in IS 10422.

The dot matrix printer shall be classified as Class 1 equipment as defined in IS 10422 where the protection against electrical shock does not rely on basic insulation only, but which includes additional safety precaution in that the accessible conductive parts are connected to the protective earthing connector in the fixed wiring of the installation in such a way that accessible conductive parts cannot become live in the event of a failure of basic insulation.

4.5.1 *Earth Leakage Current*

The leakage current shall not have a value more than 3.5 A which is the value recommended for Class 1 movable/pluggable stationary equipment. Measurement shall be made as per the method given in IS 10422.

4.5.2 *Dielectric Strength (HI Post Test)*

Short the line and neutral of the ac power line and apply 1 500V ac for 1 min between this short and the ground of power line. The mains power switch shall be kept ON. Measurement shall be made as per the method given in IS 10422.

The equipment has to be connected and initially not more than half the prescribed voltage is applied. Then it is raised rapidly to the full value. No flashover or breakdown shall occur during the test.

4.6 Host Interface

The interface can be parallel and/or serial. Default shall be parallel interface.

The signal levels to the interface connector in the printer for both parallel and serial interface shall be specified by the manufacturer in the user manual.

NOTE — In case of parallel interface, if flat cable is used, the maximum length shall be 1.5 m and if twisted pair cable is used, the maximum length shall be 2 m.

Details of interface requirments are given in Annex C.

4.7 Acoustic Noise

The noise level shall be less than 65 dB(A) while printing rolling ASCII pattern without IBM graphics characters in NLQ/LQ mode.

The noise level of the printer shall be measured in an anechoic room.

A sound level measuring instrument which gives the noise level in dB(A) shall be used for measurement. The microphone is placed towards the front side of the printer at a distance of 1 m and at a height of 0.60 to 0.65 m above the level of the printer.

A schematic view of a semi-soundless (anechoic chamber) and the position of the microphone related to the printer is shown in Fig. 1 and Fig. 2.

However, for verification at the manufacturer's place, the noise level can be measured if the environment noise is lower than the noise level expected from the printer. If the environment noise is lower than the printer noise by 10 dB(A) or more, then no correction is required. If environment noise is lower than the printer noise within 10 dB(A), then a correction factor shall be applied. The correction factors to be applied are given in Table 1.

Table 1 Corrections for Background Noise
(*Clause* 4.7)

Difference Between Noise Level Measured with Printer Printing and the Background Noise (when Printer is not Printing) in dB	Correction to be Subtracted from Noise Level Measured with Printer Printing in dB
Less than 6	Measurement invalid
6	1.3
7	1.0
8	0.8
9	0.6
10	0.4
Greater than 10	0.0

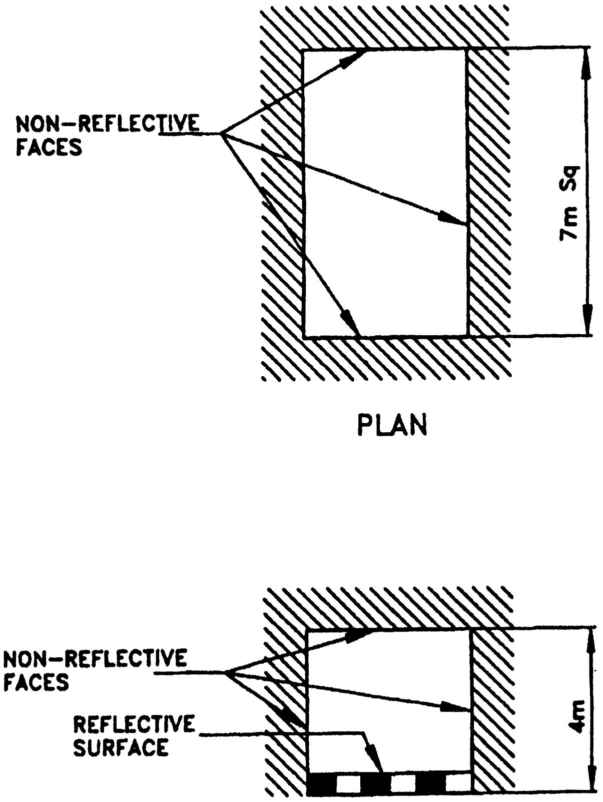
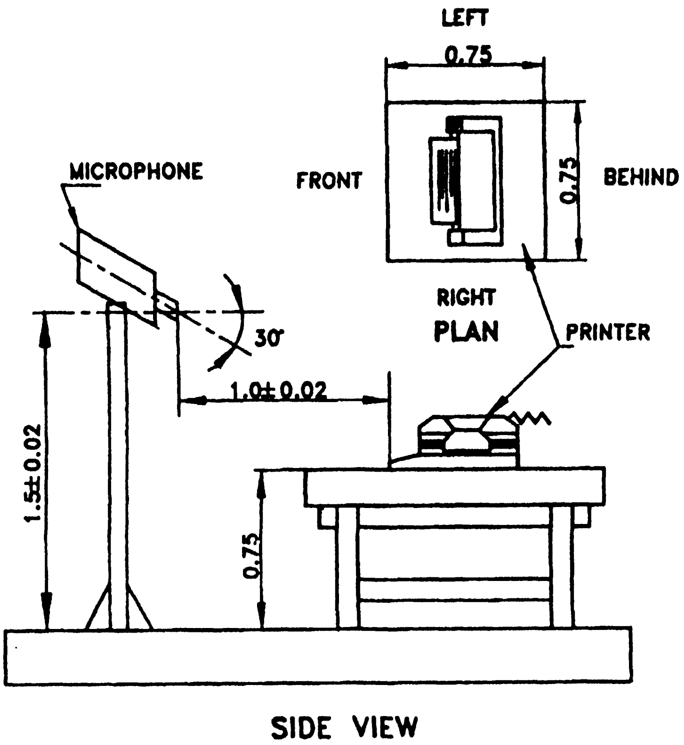


FIG. 1 MEASUREMENT ROOM (SEMI-SOUNDLESS ROOM)



All dimensions in metres.

FIG. 2 MEASUREMENT POSITION

4.8 Climatic Test Requirements

The dot matrix printer shall be subjected to the following climatic tests and the sequence of tests shall be as follows.

4.8.1 *Storage Tests*

During storage tests, the printer shall be kept in the packed condition.

4.8.1.1 *Dry heat*

The dot matrix printer shall be kept in a chamber maintained at 55 ± 2°C for 72 h. After conditioning for 72 h, the printer shall be removed from the chamber and after a recovery period of 2 h, the printer shall satisfy the functional requirements given in **4.2**. The test shall be carried out in accordance with IS 9000 (Part3/Sec 5).

4.8.1.2 *Cold*

The dot matrix printer shall be kept in a chamber maintained at −10 ± 3°C for 72 h. After conditioning for 72 h, the printer shall be removed from the chamber and after recovery period of 2 h, the printer shall satisfy functional requirements given in **4.2**. The test shall be carried out in accordance with IS 9000 (Part 2/Sec 4).

4.8.1.3 *Damp heat (Steady state)*

The dot matrix printer shall be kept in a chamber maintained at 40 ± 2°C and 93^{+2}_{-3} percent RH for 96 h. After conditioning for 72 h, the printer shall be removed from the chamber and after a recovery period of 2 h, the printer shall satisfy the functional requirements given in **4.2**. The test shall be carried out in accordance with IS 9000 (Part 4).

4.8.2 *Operational Tests*

4.8.2.1 *Dry heat*

The dot matrix printer is considered as a heat dissipating equipment. The dot matrix printer shall be kept "POWERED ON" in the chamber maintained at 40 ± 2°C for 16 h.

Self test printout shall be taken only during the last 30 min. There shall be no abnormality, malfunction or functional degradation during the test. The test shall be carried out in accordance with IS 9000 (Part 3/Sec 5).

4.8.2.2 *Cold*

The dot matrix printer shall be kept "POWERED ON" in the chamber maintained at 5 ± 3°C for 16 h. Self test printout shall be taken only during the last 30 min. There shall be no abnormality, malfunction or functional degradation during the test. The test shall be carried out in accordance with IS 9000 (Part 2/Sec 4).

4.8.2.3 *Damp heat (Steady state)*

The dot matrix printer shall be kept "POWERED ON" in the chamber maintained at 40 ± 2°C and 93^{+2}_{-3} percent RH for 16 h. Self test printout shall be taken only during the last 30 min. There shall be no abnormality, malfunction or functional degradation during the test. There shall not be any condensation on the printer. The test shall be carried out in accordance with IS 9000 (Part 4).

4.9 Product Fragility Requirement

4.9.1 *Vibration Test (in Packed and Unpacked and Non-operational Condition)*

4.9.1.1 The dot matrix printer shall be subjected to vibration test carried out in accordance with IS 9000 (Part 8) with following parameters:

a) Frequency.............10 to 150 Hz (Endurance by sweep)
b) Number of sweeps 10
c) Number of axes ....1 (Normal working axis)
d) Acceleration..........1g
e) Sweep rate............1 Octave/min

4.9.1.2 After the test, there shall not be any visual damage or loose part and the printer shall meet the functional requirements given in 4.2.

4.9.2 *Free Fall Test (in Unpacked and Non-operational Condition)*

4.9.2.1 The test shall be carried out in accordance with IS 9000 (Part 7/Sec 4). The dot matrix printer shall be allowed to fall freely from a specified height as follows:

a) Drop height .... 25 mm
b) Number of falls 2
c) Number of axes........... 1 (normal working position)

4.9.2.2 After the test, there shall not be any loose part and the printer shall meet the functional requirements given in 4.2. The test surface shall be in accordance with IS 9000 (Part 7/Sec 4).

4.10 Transport Worthiness Requirements

4.10.1 *Bump Test (in Packed Condition)*

4.10.1.1 The dot matrix printer shall be packed in the same packing in which it is despatched and subjected to bump test carried out in accordance with IS 9000 (Part 7/Sec 2) with following parameters:

a) Number of bumps : 1 000 ± 10
b) Peak acceleration : 40 *g*
c) Number of attitudes : 1 (Normal axis as indicated by the arrow or upper side of the packing)

4.10.1.2 After the test, the packing shall be opened and unit checked. There shall not be any physical damages or loose parts in the unit and the printer shall meet the functional requirements given in 4.2.

4.10.2 *Vertical Drop Test (in Packed Condition)*

4.10.2.1 The printer shall be packed in the same packing in which it is despatched and the vertical drop test is conducted in accordance with the method specified in IS 7028 (Part 4). The drop height depends upon the weight of the product. Table 2 gives the drop heights for ranges of weights of the product.

Table 2 Drop Heights
(*Clause* 4.10.2.1)

Weight of Product, kg	Drop Height, mm
Above 0.5 up to 9.5	760
Above 9.5 up to 18.6	610
Above 18.6 up to 27.7	460
Above 27.7 up to 45.4	300

4.10.2.2 The test surface on which the packing is dropped shall be as given in IS 7028 (Part 4) in following drop sequence.

Drop sequence:

1 corner, 3 edges originating from the corner in the ascending order of edge length and 6 faces.

4.10.2.3 After completion of drop test as per the sequence mentioned above, the packing shall be removed and the unit checked. There shall not be any physical damage or loose part in the unit and the printer shall meet the functional requirements given in 4.2.

4.11 MTBF or MCBF at Quoted Duty Cycle (Reliability)

4.11.1 Reference shall be made to IS 1885 (Part 39) for definition of the terminologies related to reliability.

4.11.2 Reliability is expressed in terms of Mean Time Between Failures (MTBF). Reference shall be made to 8.4.1 of IS 8161 (Part 1) for the considerations that are appropriate for either determining or demonstrating the Mean Time Between Failures of the printers.

4.11.3 The actual test conditions as applicable to the dot matrix printers shall be drafted in accordance with the test conditions given in 9 of IS 8161 (Part 1). The printing pattern, print density and duty cycle shall also be taken as test conditions. Other requirements to carry out the tests shall also be planned and kept in advance. These include stationery and ribbon necessary for carrying out the test continuously.

4.11.4 For the construction of MTBF compliance test plans, reference shall be made to IS 8161 (Part 7). In this, the various parameters to choose a particular plan need special consideration. The minimum acceptable MTBF, producer's risk, consumer's risk and discrimination ratio shall be agreed upon between the producer and the consumer. Test shall be planned for a duration of 'expected time' given in **6.2** and Tables 1 and 2 of IS 8161 (Part 7).

4.11.5 During the actual test, the test item performance and test observations shall conform to **10** of IS 8161 (Part 1). The preventive maintenance activities shall be carried out during the test as per the guidelines given in **10** of IS 8161 (Part 1).

4.11.6 The test results shall be interpreted according to the guidelines given in **11.5** of IS 8161 (Part 1). The final estimate of the reliability of the printer (actual demonstrated MTBF figure) shall be quoted in the manufacturer's specifications as per IS 8161 (Part 4).

4.11.7 Instead of MTBF, the manufacturer can also specify MCBF (Mean Cycles Between Failures). Reliability shall be tested through MTBF or MCBF. While specifying MTBF or MCBF, the manufacturer shall clearly spell out the following:

a) Duty cycle,
b) Print conditions, and
c) Environmental conditions.

5 CLASSIFICATION OF TESTS

The following three types of tests are applicable:

i) Routine tests,
ii) Acceptance tests, and
iii) Type tests.

5.1 Routine Tests

The following requirements shall be verified during the routine tests:

a) Workmanship and finish (**4.1.1**),
b) Marking (**6**),
c) Accessories and documents (**4.1.2**),
d) Electrical safety reuirements (**4.5**), and
e) All functional checks which determine the fitness of the printer for use.

5.2 Acceptance Tests

5.2.1 Manufacturer shall carry out all the routine tests in addition the following tests:

i) *Burn-in*

The unit shall be operated continuously under temperature, print mode, duty cycle and for the duration mutually agreed between the manufacturer and certifying agency or the purchaser.

ii) Any other performance tests which are required to recertify process capability mutually agreed between the manufacturer and the certifying agency or the purchaser.

5.2.2 Manufacturer shall maintain records which are subject to verification by verifying agency. Demerit system can be standardized but categorization of Critical, Major and Minor to be mutually agreed between the manufacturer and the verifying agency. For acceptance tests, the AQL levels, etc are given in Annex D.

5.3 Type Tests

5.3.1 Table 3 gives the schedule of tests in sequence mentioned therein.

Table 3 Schedule for Type Tests
(*Clause* 5.3.1)

Group	Test	Clause No.	No. of Samples
1.	i) Routine tests	5.1	3
	ii) Acoustic noise	4.7	
	iii) Burst speed	4.2.7.1	
	iv) Throughput	4.2.7.2	
2.	EMI test	4.4.2	1
3.	Climatic test	4.8	1
4.	Product fragility test (a)	4.9	1
	& transport worthiness test (b)	4.10	
5.	MTBF or MCBF for the quoted duty cycle (Reliability)	4.11	5

NOTES

1 The 3 samples subjected to Group 1 test only shall be taken up for Groups 2, 3 and 4 test (1 each).

2 The 5 numbers chosen for MTBF or MCBF test shall be fresh samples which have not been subjected to any of the Group tests (Group 1, 2, 3 and 4).

5.3.2 Minimum number of samples for the type tests (including reliability tests) shall be 8. These shall be of the same model, type and make selected at random from the regular production lot.

5.3.3 *Routine Tests*

All 3 samples shall be subjected to routine tests. In addition, they shall be checked for the following performance tests:

i) Acoustic noise,
ii) Burst speed, and
iii) Throughput.

All 3 samples should pass the above tests.

5.3.4 *EMI Test*

One sample out of the above 3 shall be subjected to EMI test. After the test, the sample should pass all functional checks which determine the fitness of the printer for use.

5.3.5 Climatic Tests (Storage and Operational)

One sample out of the above 3 (which is different from the sample tested for EMI/EMC) shall be subjected to climatic tests. After the test, the sample shall pass all functional checks which determine the fitness of the printer for use.

5.3.6 Product Fragility and Transport Worthiness Tests

The third sample is subjected to the following tests.

5.3.6.1 *Product fragility*

The sample shall be subjected to product fragility test (vibration test and free fall test — in unpacked condition). After each test, there shall be no visible damages or failures. Also, the sample shall pass all functional checks which determine the fitness of the printer for use.

5.3.6.2 *Transport worthiness test*

The above sample shall be subjected to transport worthiness test (bump and vertical drop in packed condition). After each test, the packing is opened and checked. There shall be no visible damages or loose parts. Also, the sample shall pass all functional checks which determine the fitness of the printer for use.

NOTE — If there is a failure in any of the type tests, twice the number of samples shall be taken and tested for that failure.

5.3.7 MTBF or MCBF for the Quoted Duty Cycle (Reliability Test)

Minimum number of samples shall be 5. The test shall be conducted under the same conditions for which the MTBF or MCBF has been specified by the manufacturer.

5.3.8 Presentation of Type Test Results

The type test results shall be reported in a tabular form as shown in Table 4.

6 MARKING

6.1 Dot matrix printer shall be clearly and indelibly marked with atleast the following information:

a) Manufacturers name, trade-mark or identification mark;
b) Type or Model No. and serial No.;
c) Input supply voltage (type of supply/supplies, voltages, frequency);
d) Operating power (power consumption) in VA or rated current in amperes; and
e) Additional markings for safety such as high voltage points with their voltage value.

Letter symbols shall be according to IS 3722 series and graphical symbols shall be according to IS 12032 (Part 2).

NOTE — Letter symbols and graphical symbols for items not included in standards mentioned above and all other kinds of markings shall be clearly identified by the manufacturer in the 'User Manual' to be supplied with the equipment.

6.1.1 In addition to the above, the following may be marked on the packing boxes:

i) Month and year of manufacture,
ii) Manufacturers address, and
iii) Contents.

Pictorial markings on the packing boxes shall be according to IS 1260 (Part 2).

6.2 The dot matrix printer may also be marked with the Standard Mark.

6.2.1 The use of the Standard Mark is governed by the provisions of *Bureau of Indian Standards Act*, 1986 and the rules and regulations made thereunder. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Table 4 Presentation of Type Test Results
(*Clause* 5.3.8)

Sl No.	Type of Test	Test Result	Remarks
1.	i) Routine tests ii) Acoustic noise iii) Burst speed iv) Throughput		
2.	EMI test		
3.	Climatic tests		
4.	Product fragility test and transport worthiness test		
5.	Reliability (MTBF or MCBF) at duty cycle............		

NOTE — While evaluating the overall performance, it is necessary that throughput, duty cycle and reliability are simultaneously recorded and observed.

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
1260 (Part 2) : 1979	Pictorial markings for handling and labelling of goods:Part2 General goods
1885	Electrotechnical vocabulary:
(Part 39) : 1979	Part 39 Reliability of electronic and electrical items (*first revision*)
(Part 52) series	Data processing
3722 series	Letter symbols and signs used in electrical technology
6842 : 1977	Specification for limits for electromagnetic interference (*first revision*) (with amendments 1 and 2)
7028 (Part 4) : 1987	Performance tests for complete, filled transport packages: Part 4 vertical impact drop test (*first revision*)
8161	Guide for equipment reliability testing:
(Part 1) : 1976	Part 1 Principles and procedures
(Part 4) : 1985	Part 4 Procedures for determining point estimates and confidence limits from equipment reliability determination tests
(Part 7) : 1977	Part 7 Compliance test plans for failure rate and mean time between failures assuming constant failure rate
9000	Basic environmental testing procedures for electronic and electrical items
(Part 1) : 1988	Part 1 General (*first revision*)
(Part2/Sec 4) : 1977	Part 2 Cold test, Section 4 Cold test for heat dissipating items with gradual change of temperature
(Part3/Sec 5) : 1977	Part 3 Dry heat test, Section 5 Dry heat test for heat dissipating items with gradual change of temperature
(Part 4) : 1979	Part 4 Damp heat (steady state)
(Part 7/Sec 2) : 1979	Part 7 Impact test, Section 2 Bump
(Part 7/Sec 4) : 1979	Part 7 Impact test, Section 4 Free fall
(Part 8) : 1981	Part 8 Vibration
10401 : 1982	8-Bit coded character set for information interchange
10422 : 1982	Requirements and test methods for safety of data processing equipment
10673 : 1983	Sampling plans and procedures for inspection by attributes for electronic items
12032 (Part 2) : 1987	Graphical symbols for diagrams in the field of electrotechnology: Part 2 Symbols elements, qualifying symbols and other symbols having general application
12360 : 1988	Voltage bands for electrical installations including preferred voltages and frequency
13194 : 1991	Indian script code for information interchange (ISCII)

ANNEX B

(*Clause* 4.2.7.2)

MEASUREMENT OF THROUGHPUT OF PRINTERS

B-1 GENERAL

B-1.1 This test is intended for use by the printer manufacturers and test houses so that a common form of test result presentation for the throughput shall be made. It will also enable the user to make a quick and easy comparison of the printing throughput of different printers. The test specifies three different test patterns given below:

i) a standard business letter in German,
ii) a spreadsheet with English words, and
iii) a graphics pattern.

B-1.2 These test patterns are intended to measure only the printer throughput and not to evaluate any other features such as character spacing, print compressions, network/controller performance, paper handling, colour, etc. The method is relevant to all types of dot matrix printers and to all configurations (for example tractor feed, cutsheet feed, 80 column and over 132 column print width, etc).

B-1.3 For measurement of throughput, following tests shall be conducted.

B-1.3.1 *Short Duration Test (Printing only 5 Pages)*

This test is designed to enable measurement of printer under typical user application print tasks. Short duration test shall be conducted on all test patterns.

B-1.3.2 *Extended Duration Test (Printing for 1 hour Duration)*

This test is designed to show any effects of extended high duty print tasks on printing throughput, due to any limiting factors within the printer (for example dot density limitations, temperature risks, etc). The extended duration test shall be conducted only on standard business letter pattern.

B-1.4 For both types of test, throughput is expressed in Pages Per Hour (PPH). PPH is calculated from the following formula:

$$\text{PPH} = \frac{\text{Number of printed pages} \times 3\,600}{\text{Measured time in seconds}}$$

NOTE — All tests with cutsheet paper are intended to be performed only on printers which have automatic sheet feeder facility.

B-2 Procedure for Short Duration Test (Printing only 5 Pages)

B-2.1 In the short duration test, the test pattern shall be transmitted from the host system 5 times. The testing time shall start from the time the key on the host computer is pressed which initiates the transmission data to the printer.

B-2.2 There will be a measurable time delay between initiating the data transfer from the keyboard and the start of transmission of data to the printer. This can have a sufficient effect on the test result accuracy. The test operator shall ensure that for the computer system used, the test start time delay does not affect the test time measurement by more than 1 percent.

B-2.3 When the test is performed with cutsheet paper, the test shall be started with no paper loaded (first operation the printer must perform in the test is to load the first sheet). The measurement of the time required by the test shall end when the fifth sheet has been ejected.

B-2.4 When the test is performed with continuous paper, the test shall start with the paper loaded to the top of form position and measurement of time shall end after executing the form feed at the end of printing the fifth page.

B-2.5 The throughput figures shall be recorded along with a reference to the virtual matrix used.

B-3 Procedure for Extended Duration Test (Printing for 1 h Duration)

B-3.1 In the extended duration test, the test pattern shall be transmitted from the host system repeatedly. The testing time shall start from the time the key on the host computer is pressed which initiates the transmission of data to the printer.

B-3.2 There will be a measurable time delay between initiating the data transfer from the keyboard and the start of transmission of data to the printer. This can have a sufficient effect on the test result accuracy. The test operator shall ensure that for the computer system used, the test start time delay does not affect the test time measurement by more than 1 percent.

B-3.3 When the test is performed with cutsheet paper, the test shall be started with no paper loaded (the first operation the printer must perform in the test is to load the first sheet). All the tests with cutsheet paper are intended to be performed only on printers which have automatic sheet feeder facility.

B-3.4 When the test is performed with continuous paper, the test shall start with the paper loaded to the top of form position and measurement of time shall end with the completion (ejection) of the first sheet after 1 hour has elapsed (1 hour and one second) so that a whole number of pages shall be printed.

B-3.5 The one hour test time shall include any time required to reload the paper, change ribbon cassette or replenish ink/toner supplies. It is assumed that the test is commenced with new consumables.

B-3.6 The throughput figures shall be recorded along with a reference to the virtual matrix used.

B-4 TEST CONDITIONS

B-4.1 Test Environment

The test shall be performed under following environment

Temperature: 25°C to 30°C
Relative Humidity: 50 percent to 80 percent.

The printer, fully enclosed in its normal operating cover set, shall be acclimatized in the test environment in powered condition for at least 1 hour.

B-4.2 Voltage

The printer shall be connected to a voltage supply which remains within ± 10 percent of the nominal value of the mains voltage.

B-4.3 Data Input

Data shall be sent to the printer at such a rate that the printer is never waiting for data to arrive and therefore producing a misleading (lower) throughput figure.

B-4.4 Test Sequence

Each test sequence shall be completed without stopping. After each test sequence, the printer shall be allowed to restabilise (cool down) to its normal powered up ambient state.

B-4.5 Stationery

The paper used shall have form length 304.8 mm (12 inches).

Specifications for cutsheet, fan fold single ply and fan fold multi ply (original plus two copies, including carbon) shall be as per manufacturer's specifications.

NOTE — Test with cutsheet paper shall be operated in automatic mode and not in manual single sheet feed mode. A4 size paper shall be used and loaded in portrait mode.

B-4.6 Printer Settings

B-4.6.1 *Form Length*

Before starting the test (for letter test pattern and for spread sheet test pattern), the form length shall be set to 304.8 mm (12 inch).

B-4.6.2 *Skip over Perforation*

This shall be disabled through suitable means.

B-4.7 Test Parameters

The following shall be the test parameters for generating the 3 test patterns.

B-4.7.1 *For Letter Test Pattern*

a) Short duration test:

NOTE — Set up shall be for 0.4 character per mm (10 CPI) and 0.24 line per mm (6 lines per inch) operation.

   i) Printer in "Draft Quality" mode
   ii) Printer in "BEST QUALITY" mode

b) Extended duration test: Printer in "BEST QUALITY" mode.

B-4.7.1.1 The test pattern for Letter test shall be standard letter given in **B-8**. It has been selected because it is an existing, well defined standard already in use internationally. The German character set shall be enabled through suitable means (Dip switches/Front panel) if this feature is available in the printer.

B-4.7.2 *For Spreadsheet Test Pattern*

a) Short duration test:
   i) Printer shall be set up for 0.4 character per mm (10 CPI). This test shall not be performed on printers having a print line length of less than 335 mm (13.2 inch) that is 132 column printer.
   ii) The print density mode shall be set to the compressed mode, normally 0.67 character per mm (17 CPI). If this is not available, then a compression in the range 0.65 character per mm (16.5 CPI) to 0.71 character per mm (18 CPI) shall be selected.
   iii) The test pattern for the spreadsheet test shall be the 132 column spreadsheet.

NOTE — Set up shall be for 0.4 character per mm (10 CPI) and 0.24 line per mm (6 lines per inch) and Draft Quality mode.

b) Extended duration test: Not suggested.

B-4.7.3 *For Graphics Test*

a) Short duration test:
   The minimum density to be tested is 2.63 H × 2.83 dots per mm (60 H and 72 V dots per inch).
   The printer shall be kept in uni-directional mode of printing while carrying out the graphics test.

NOTES

1 The test pattern sent to the printer shall utilize graphics mode printing (for example vectors, bite map) and shall not use character mode printing (for example block graphics characters).

2 The dimensions defined are minimum dimensions. Any minor size deviations are permitted if they yield a larger but not a smaller image.

b) Extended duration test: Not suggested.

B-5 PRESENTATION OF TEST RESULTS

Results recorded from the tests shall be presented in tabular form for various test patterns as given in the next page.

B-6 INFORMATION ON THE PRINTED TEST PATTERN

Qualification to this standard letter should be accepted in the overseas market and so the original German letter has been retained in B-8. However, if the passage is required to be translated into another language, the text of this standard letter shall remain in order to ensure correlation between measurements made at different locations.

If the printer cannot support German text, any other letter corresponding to ASCII code can be printed for the throughput measurement.

B-6.1 Letter Test Pattern

The standard letter reproduced in B-8 has been taken from a DIN standard (DIN 32751). The text of the letter starts with the word "Eilzuseallung" and ends with the word "Mustervordrucke".

B-6.2 Spreadsheet Test Pattern

The text of the spreadsheet starts with the word "SPREADSHEET" and ends with the group of words "bottom right-hand last line of twelve double underline characters" as given in B-9.

B-6.3 Graphics Test Pattern

The frame of 127 mm × 165 mm (5" × 6.5") enclosing the four black rectangles is part of the test pattern. It shall be printed at a distance of ten SPACE characters from the left-hand edge of the sheet at a character pitch of 0.4 character per mm (10 CPI).

B-7 Verification of Character Matrix

The tests results of throughput shall be declared along with the character matrix. Verification of matrix also shall be carried out along with the throughput.

Character matrix shall be prepared in draft mode. Characters E, T and H with all underlines shall be selected for matrix definition.

For 9 wire printer, 5 horizontal dots for 9 × 12 matrix and 4 horizontal dots for 9 × 10 matrix at 0.4 character per mm (10 CPI) shall be selected for matrix.

For 24 wire printer, it will be wavy line of 9 horizontal dots for 24 × 12 matrix and 7 horizontal dots for 24 × 10 matrix at 0.4 character per mm (10 CPI).

B-8 STANDARD LETTER

Eilzustellung

Norddeuteche Farbenwerke KG
Herrn Dr, Grauert
Gro"e Elbstra" 64

2000 Hamburg 4

Org. 111 5/37 HA 4 34 22.04.75
7.04.75 Volkmann

Vordruckgestaltung f)r den allgemeinen Schrift-

verkehr, f)r das Bestell - und Rechnungswesen E i it

Sehr geehrter Herr Dr. Grauert,

Sie kinnen das Schreiben der Briefe, Bestellungen, Rechnungen usw. sowie das Bearbeiten des Schriftgutes rationalisieren, wenn die Vordrucke lhres Unternehmens den folgenden Normen entsprechen:

DIN 676 Geschiftsbrief: Vordrucks A4
DIN 677 -; Vordruch A5
DIN 679 Geschiftspostkarte; Vordruck A6
DIN 4991 Vordrucks im Lieferantenverkehr; Rechnung
DIN 4992 -; Bestellung (Auftrag)
DIN 4993 -; Bestellungeannahme (Auftragsbest (tigung)
DIN 4994 -; Lieferschein/Lisferanzeige
DIN 4998 Entwurfsbl(tter f)r Vordrucke

Diese Normen enthalten alle Einzelheiten f) r den sinnvollen und zweckm("igen Aufdruck, Wenn dazu bei der Beschriftung genormter Vordrucke DIN 5008 "Regein f) r Maschinenschreiben" beachtet wird, entstehen) bersichtliche und werbewirksame Schriftst)cke.

Die beigef)gten 6 Mustervordrucke zeigen, da" das Beachten der Normen die k) nstlerische and werbewirksame Gestaltung der Vordrucke nicht ausschlie"t.

Da wir uns auf die Herstellung genormter Vordrucke spezialisisrt haben, kinnen wir besonders billig liefern. Eine Probabestellung wird sie und thre Gesch(ftsfreunds ven den Vorteilen) berzeugen.

Mit bester Empfehlung

NORAG
Druckerei und Verlagshaus KG

Hermann

Anlagen
6 Mustervordrucke

B-9 SPREADSHEET TEST

SPREADSHEET TEST
TYPICAL YEARLY CASH FLOW ACCOUNT

	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Total
	*	*	*	*	*	*	*	*	*	*	*	*	
Revenue													
Salary	12 345	67 890	12 345	67 890	12 345	01 234	56 789	01 234	56 789	01 234	50 123	44 567	901 234 567 358
Property	123	456	7 890	1 234	5 878	9 012	2 123	4 501	2 345	6 789	0 123	4 567	89 012 194 678
Rates Car Repayment	123	4 567	8 901	2 345	6 789	0 123	4 501	2 345	6 789	0 123	4 567	8 901	23 450 543 224
Food Purchases	1 234	4 567	9 012	3 456	7 890	1 234	5 012	3 456	7 890	1 234	5 678	9 012	34 501 659 100
Personal Taxes	1 234	4 567	9 012	3 456	7 890	1 234	5 012	3 458	7 890	1 234	5678	9 019	34 501 543 224
Gas			012			012			012			012	0 012 210 876
Electricity		123			123			123			123		1 232 486 050
Insurance		908							123				8 905 432 243
Car Repairs		234		567			895						1 237 358 004
House Repairs				678			901						6 781 946 780
Entertainment	55	22	33	45	65	75	85	95	05	16	25	32	4 547 934 568
Pension	909	129	349	589	539	695	891	696	914	149	051	493	4 149 580 7081
Fund Sundry	588	788	888										9 017 483 242
Accountancy	123	456					7 890						72 345 041 253
Telephone			234			403			055			550	12 347 413 106
Travelling Expenses	455	295	395	095	059	359	451	251	929	051	590	959	52 251 291 405
House Expenditure													
House	051	011	921	4 519	2 519	5 059	9 299	9 540	2 040	8 544	651	351	95 125 715 432
Repayments													
House			3 185		3 185			0 592			3 512		38 512 795 382
TOTAL OUTGOING	7 358	1 948	54 322	8 591	21 087	34 225	56 789	01 234	40 123	44 567	90 123	45 678	901 234 765 502
NET BALANCE													
BALANCE B/FWD	– 1 234	4 567	9 012	3 458	78 901	23 450	12 345	87 890	12 345	67 890	12 354	12 345	– 12 345 406 810
BALANCE C/FWD	1 234	4 567	9 017	23 457	78 907	12 345	05 578	45 199	25 199	52 259	12 549	25 959	25 159 109 152

ANNEX C

(*Clause* 4.6)

HOST INTERFACE

C-1 SERIAL INTERFACE

The standard serial interface shall be a EIA RS 232C asynchronous interface. The functional specification defines Minimum Signal Set, Data Format and Hand Shaking protocol.

C-1.1 Minimum Signal Set

The following minimum set of signals shall be present in any implementation of this interface.

FG:	This signal will be connected to the Frame Ground of the printer.
SG:	This signal will be connected to the Signal Ground of the printer.
TXD:	This signal is the Transmit signal from the printer to the host used by the printer to transmit the data to the host.
RXD:	This signal is the Receive signal from the host to the printer used by the printer to receive data from the host.
DTR:	This signal is used to signal the ready/busy state of the printer to receive more data.

Other signals are optional and to be specified by the manufacturer.

C-1.2 Data Format

The printer should support at least 3 bit rates out of the following 4 bit rates.

300, 1 200, 2 400 or 9 600 bits per second. Other bit rates are optional and to be specified by the manufacturer.

The data shall be transmitted serially with LSB first and MSB last.

C-1.3 Hand Shaking Protocol

The printer will use both DTR signal and the Transmit singal to indicate ability or inability to accept further characters from the host.

The DTR singal will be at SPACE condition when the printer can accept more characters and will be at MARK condition when the printer can not accept any further characters.

Single or Multiple X-ON or X-OFF can be sent and this is to be specified by the manufacturer.

The printer will indicate its inability to accept any further characters when the printer has no room in its buffer. It will indicate its ability to accept more characters when it has room in its buffer. Manufacturer should specify the buffer capacity.

C-2 PARALLEL INTERFACE

The parallel interface pin configuration from the printer shall be Centronics compatible.

C-2.1 Electrical Specification

C-2.1.1 *Levels*

i) Output voltage

LOW LEVEL	$0 \le VOL \le 0.5$ V
HIGH LEVEL	$2.4 \le VOH \le 5.5$ V

ii) Output current

Maximum sinking current	8 A
Maximum sourcing current	0.4 mA

iii) Rise and fall times

5 nano seconds to 100 nano seconds

iv) Input voltage

LOW LEVEL	$0 \le VIL \le 0.8$
HIGH LEVEL	$2.0 \le VIH \le 5.5$

v) Input current:

Maximum source current	$IIL \le 2$ mA
Maximum sinking current	$IIH \le 0.1$ mA

NOTE — The current flowing out of the printer is termed as "Sourcing" The current flowing into the printer is termed as "Sinking".

C-2.2 Mechanical Specification

For parallel interface, the connector used in the printer should be 36 pin female connector.

C-2.3 Functional Specification

The functional specification includes the data format, signal set and hand shaking protocol.

C-2.3.1 *Data Format*

The data format is 8 bit parallel.

C-2.3.2 *Signal Set*

The Table 5 given describes the signal and pin assignment for parallel interface. In this table, the direction of signals is given relative to the printer.

Table 5 Signal Set
(*Clause* C-2.3.2)

Signal Pin	Return Pin	Signal	Direction	Description
1	19	STROBE	IN	Strobe pulse on this line causes data to be read in. The signal level is normally HIGH. A low pulse on this signal latches DATA.
2	20	DATA 1	IN	These signals represent data sent to the printer. A HIGH level represents a binary 1 digit
3	21	DATA 2	IN	
4	22	DATA 3	IN	
5	23	DATA 4	IN	
6	24	DATA 5	IN	
7	25	DATA 6	IN	
8	26	DATA 7	IN	
9	27	DATA 8	IN	
10	28	ACKNLG	OUT	Acknowledge pulse is sent upon completion of data input operation or whenever HIGH to LOW transition of BUSY signal takes place.
11	29	BUSY	OUT	Busy signal goes HIGH in the following cases: - the Buffer is full, or - a printer fault has occurred
12	30	PE	OUT	A HIGH signal indicates that the paper is out of printer
13	—	SELECT OUT	OUT	Optional, when not used, to be connected to +5V via resistor
14	—	AUTO FEED XT	IN	Optional
15	—	NC		Not Used
16	—	GND		Signal Ground level
17	—	FGND		Connected to printer chassis
18	—	—		Optional
19-30	—	GND		Signal and return for pins 1-12
31	—	INIT/ INPUT PRIME	IN	Low pulse causes hardware reset. Minimum pulse width to be specified by manufacturer.
32	—	ERROR	OUT	This is Low when there is no paper, printer is off-line or an error occurs.
33	—	GND		Signal Ground level
34	—	NC		Not used
35	—	—		Optional
36	—	SELECT IN	IN	Not used

C-2.4 Hand Shaking Protocol

The timing diagram (*see* Fig. 3) given and following test express the hand shaking protocol.

ACKNLG should be at HIGH level normally. It should be pulsed LOW whenever a HIGH to LOW transition occurs on the BUSY signal.

BUSY should be at LOW level normally indicating READY condition of printer to participate in data transfer. It should be at HIGH level indicating busy condition of printer and its inability to participate in data transfer.

The printer shall indicate BUSY under the following conditions:

a) After a data transfer has been initiated;
b) When a no paper condition has been detected and has not been disabled by software command;
c) When the printer has detected an internal error; and
d) When the print buffer is full.

STROBE should be at HIGH level normally. It should be pulsed LOW to initiate data transfer. It should not be pulsed LOW until the previous data transfer sequence has been terminated by a BUSY and ACKNLG sequence.

STROBE signal should have a proper filtering circuit to reject spurious strobe spikes.

ERROR should be at HIGH level under normal conditions. It should be held LOW under the following conditions.

a) When a no paper condition has been detected and has not been disabled by software command.
b) When the printer has detected an internal error.

In all other conditions, it should be held HIGH.

PE should be held HIGH when the printer detects a "no paper condition and such a detection has not been disabled by a software command. In all other conditions, it should be held LOW.

The timing diagram (Fig. 3) and Table 6 describe the relationship between STROBE, DATA, BUSY and ACKNLG signals.

Table 6 Signal Timing
(*Clause* C-2.4)

Timing Diagram	Description	Minimum	Maximum
(1)	(2)	(3)	(4)
Tds	DATA to STROBE Setup time	0.5 μs	0.5 μs
Tdh	STROBE to DATA Hold time	0.5 μs	0.5 μs
Tw	STROBE Width	0.5 μs	50 μs
Tabd	ACKNLG LOW to BUSY LOW delay	To be specified by the manufacturer	
Tbad	BUSY LOW to ACKNLG HIGH delay	do	

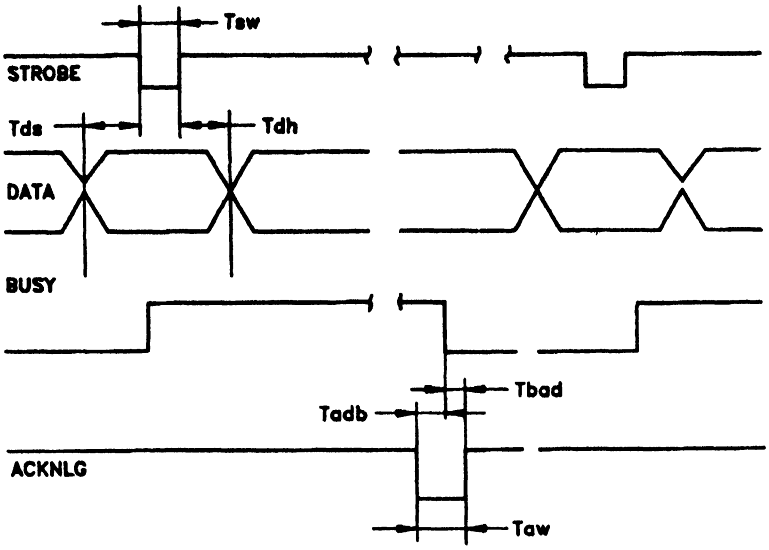


FIG. 3 TIMING DIAGRAM

ANNEX D

(*Clause* 5.2.2)

ACCEPTANCE TEST PLANS

D-1 For the purpose of acceptance of the lot, the purchaser may follow the acceptance test plan and procedure given below.

D-1.1 Segregate all product characteristics into the following groups:

Critical (Cr): Defects leading to Printer becoming unusable.

Major (Mj): Printer's performance is affected.

Minor (Mi): Annoying but do not affect performance.

Acceptance test plans cover Cr, Mj and Mi characteristics as per the above definition.

D-1.2 No specific acceptance test plan is required for those features or characteristics of the product for which even if one sample is checked, the entire population's behaviour will be known. Segregation of product features into the above categories shall be done mutually by the manufacturer and the purchaser/verifying agency.

D-1.3 The performance levels for different criticalities of defects as defined above may be mutually decided between the purchaser and the manufacturer. The performance levels thus arrived at, are required to be considered for the purpose of determining the DEMERIT ACCEPTABL QUALITY LEVEL for the product.

D-1.4 It was felt that monitoring separate sampling plans for different criticalities becomes practically difficult. Hence a common sampling pla based on total demerit score needs to be developed

D-1.5 The weightages for various criticalities shal be as given in Table 7.

Table 7 Weightages
(*Clause* D-1.5)

Groups of Product Features	Weightage
Critical	1.0
Major	0.6
Minor	0.2

D-1.6 Total demerit acceptable quality level ma be determined as given in Table 8.

Table 8 Demerit Acceptable Quality Level
(*Clause* D-1.6)

Groups of Product Features	AQL Weightage	Demerit Score
Critical	A1 × 1.0	A1
Major	A2 × 0.6	0.6 A2
Minor	A3 × 0.2	0.2 A3

Total Demerit Score is A1 + 0.6 A2 + 0.2 A3

The final value of Demerit AQL for the product will be chosen from the Standard AQL values as per IS 10673 which is closest to the value of Total Demerit Score.

The sample size for a given lot size and the Acceptance/Rejection number may be chosen from IS 10673 and Inspection Level II may be followed for the purpose of sampling. All other switching over rules etc. shall be in accordance with IS 10673.

D-1.7 Demerit Sampling Plan

Samples shall be collected depending upon the lot size. Number of defects in the samples under each product characteristics group, namely, Critical, Major and Minor as defined earlier are counted. Number of defects thus obtained are multiplied by the respective weightage factors. These are added to get the Demerit score. The Demerit score thus obtained is compared with the acceptance number mentioned in IS 10673 against the respective lot size and the Demerit AQL. If the Demerit score is less or equal to the acceptance number, the lot shall be accepted. If not, the lot shall be rejected. Example of using Demerit sampling plan is shown in Table 9.

Table 9 Example of Using Demerit Sampling Plan
(*Clause* D-1.7)

	i)	Characteristic group	**Critical**	**Major**	**Minor**
	ii)	Satisfactory performance level	0.65%	1.00%	2.50%
OBTAINING DEMERIT AQL	iii)	Weightages	1.0	0.6	0.2
	iv)	Values in (ii) multiplied by corresponding values in (iii)	0.65	0.6	0.5
	v)	Sum of values in (iv)		1.75	
	vi)	Demerit AQL		1.50	
	vii)	Lot size		100	
	viii)	Sample size (n) Acceptance No. (c)		125 5[1]	
USING DEMERIT PLAN	ix)	No. of defects	0	1	5
	x)	Defects multiplied by corresponding weightages	0	0.6	1.0
	xi)	Demerit score = Sum of row (x)	1.6		
	xii)	Decision	1.6 is less than c which is equal to 5. Hence the lot is accepted.		

[1] Refer IS 10673 for Level II Normal Inspection, 1.5 AQL.

Bureau of Indian Standards

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This Indian Standard has been developed from Doc: No. LTD 37 (1516).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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Northern	: SCO 335-336, Sector 34-A, CHANDIGARH 160022	60 38 43 60 20 25
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